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Case Report

Summer-type relapsing fever (hypersensitivity pneumonitis) secondary to *Cladosporium herbarum* in the domestic environment

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ABSTRACT

'Summer-type relapsing fever' is the most prevalent form of hypersensitivity pneumonitis in Japan. It is usually caused by hypersensitivity to *Trichosporon cutaneum* – a seasonal mould which thrives in homes with damp, decayed wood, damp mats and bedclothes. The disease has been rarely described outside Japan. We report the first documented case of summer-type hypersensitivity pneumonitis in Europe – in this case caused by hypersensitivity to the mould *Cladosporium herbarum*.

1. Case history

In June 2003 a 27-year-old Caucasian woman was admitted to hospital with a two-week history of fever, cough and anorexia. She reported that she had not felt well since the summer of 2001 when she gave birth to triplets by caesarean section. Prior to the birth, she had worked full-time in an office. Following delivery she returned home but within two days she developed symptoms of dry cough, rigors and dyspnoea. She was admitted to another hospital where she was treated with antibiotics for a presumed respiratory infection and made a rapid recovery. In the summer of 2002 she again developed symptoms of dry cough and dyspnoea and was referred to the Chest Clinic. Physical examination at that time was normal. Initial investigation with spirometry showed a restrictive pattern and her chest radiograph was considered to be normal. Unfortunately, she failed to attend further investigations.

At the time of her third presentation in summer 2003, she had a temperature of 38.4 °C, her respiratory rate was 32/min and pulse 124/min. On auscultation of her chest she had bi-basal fine inspiratory crackles and normal heart sounds. There was no evidence of lymphadenopathy or finger clubbing. Remainder of the examination was unremarkable.

2. Laboratory findings

Routine laboratory analysis revealed a white cell count of 14.2×10^{-9} with marked neutrophilia, CRP of 154 with normal liver and renal biochemical profile. Erythrocyte sedimentation rate was 30 and autoimmune panels were within the normal range. Arterial blood gas analysis on breathing air showed significant hypoxemia with pO_2 of 5.79 kPa and spirometry was restrictive with forced expiratory volume (FEV1) of 1.54 L (45% predicted) and forced vital capacity (FVC) of 1.54 L (39% predicted). Serum precipitins to avian proteins and *Aspergillus fumigatus* were negative. Her chest radiograph (Fig. 1) showed bilateral lower zone homogeneous shadowing and a high resolution CT scan of the thorax (Fig. 2) showed an extensive ground glass appearance with mosaic attenuation and peripheral nodules. Broncho-alveolar lavage revealed 95% lymphocytes and a transbronchial biopsy showed patchy lymphocytic infiltration without evidence of vasculitis although there were no obvious granulomata. This clinical presentation in combination with the radiological abnormalities and findings on BAL and histology was thought to be consistent with the diagnosis of hypersensitive pneumonitis.

As we felt that an antigen in her domestic environment was the likely cause of her condition we made a visit to her home. A green-black mould was observed to be growing on the bathroom ceiling, on the bathroom window frame outside the house and on the mat outside her back door. Scrapings of the mould were taken for culture. Culture plates for moulds were also placed in each room of the house and left exposed for 30 min. The cultured scrapings produced a pure growth of *Cladosporium herbarum* which was also

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Fig. 1. Chest radiograph showing bilateral mid and lower zone ground glass shadowing.

grown on plates from the kitchen, bedroom and bathroom. The patient's serum was analysed for precipitins to *C. herbarum* by gel diffusion using a combined somatic and culture filtrate extract (50:50) at a concentration of 20 mg/mL (Microgen Bioproducts Ltd., Camberley, Surrey, UK). We also used an ELISA technique on Immunulon 4 plates sensitised with *C. herbarum* extract at 10 μg/mL. IgG to *C. herbarum* was detected with alkaline phosphatase-conjugated goat anti-human IgG (Sigma, Poole, Dorset, UK). Both techniques demonstrated the presence of antibodies to *C. herbarum* in our patient's serum. She declined a diagnostic rechallenge by the antigen in view of the severity of her previous reaction.

3. Discussion

Japanese summer-type relapsing fever accounts for 74% of hypersensitivity pneumonitis in Japan.[1] It is caused by hypersensitivity to seasonal moulds which grow in damp, poorly ventilated, shady houses. Japanese females are affected twice as often as males. This is thought to be because historically, in Japan, fewer women have been in full-time employment and spend more time in the home environment.[1] The condition follows a classic seasonal pattern with provocation of symptoms in the summer months. It is usually caused by hypersensitivity to *Trichosporon cutaneum* but *Cryptococcus albidus* and *Gyrodontium versicolor* have been occasionally implicated.[2,3] Summer-type relapsing fever usually presents with a number of clinical characteristics that make it easily recognisable in Japan.[4] These are: dry cough, dyspnoea and fever which recur each summer; provocation of symptoms in the home environment; laboratory, radiological, and histological findings compatible with a diagnosis of hypersensitivity pneumonitis; and serum antibodies to a mould cultured from the domestic environment. It has been described outside Japan in only one South African family and one lady in South Korea[5,6] and as far as we are aware, this is the first reported case in Europe.

For the timing of onset of symptoms in our patient is noteworthy. For few weeks prior to the birth of her triplets, she stopped work and spent more time exposed to the mould in her home. It also seems likely that her symptoms became more pronounced as the natural immunosuppression of pregnancy diminished. Her presentation over three consecutive summers is in keeping with environmental mycology studies which have shown that high levels of *Cladosporium* fungal spores correlate with higher summer temperatures.[7]

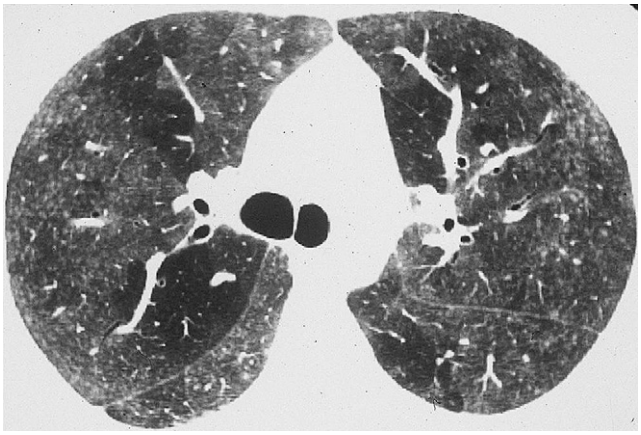

Fig. 2. High resolution CT scan of the thorax showing diffuse ground glass shadowing with mosaic attenuation and peripheral nodules.

The patient was advised to clean her house thoroughly and to keep it free from mould. We treated her with oral prednisolone 40 mg daily for four weeks and the dose was then slowly withdrawn. Her lung function tests steadily improved and she is now completely well.

Despite being relatively common in the domestic environment, *Cladosporium* is a rare cause of hypersensitivity pneumonitis. However, cases have been reported where it was isolated from a hot tub, a mouldy tapestry in a bedroom and in an air conditioning unit.[8–10] It is interesting to speculate why no other cases of summer-type hypersensitivity pneumonitis have been described in Europe. This may relate to domestic environments which do not favor the growth of relevant fungi, a lack of genetic predisposition in the European population or a failure by clinicians to recognise the condition.

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Conflict of interest

No potential conflict of interest has been declared by all authors.

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